

REMARKS

This Amendment is filed in response to the Office Action dated March 29, 2004, which has a shortened statutory period set to expire June 29, 2004.

Miyano And Kane Fail To Disclose Or Suggest Applicants' Claims

Applicants respectfully submit that the cited references Miyano and Kane do not teach various recited limitations of the claims. Specifically, Claim 1 recites in part:

- determining a centerline of the feature based on a representation of the mask;
- measuring a first length of a first rib extending from the centerline to one edge of the feature;
- measuring a second length of a second rib extending from the centerline to the one edge of the feature; and
- comparing the first and second lengths to determine the edge roughness.

Miyano and Kane fail to teach the recited centerline and its use. Applicants now traverse the characterizations in the Office Action.

Fig. 14 of Miyano, as cited in the Office Action with respect to Claim 1, is a view showing a method for converting a contour of a reticle pattern indicated in a polar coordinate. Col. 6, lines 7-8. Therefore, this passage has nothing to do with a centerline and its associated ribs of a feature. Applicants note that the passage cited in the Office Action, i.e. col. 9, lines 24-41, refers to FIG. 14, but appears to actually refer to standard figure 14 (see Figs. 5 and 7).

Col. 10, lines 47-60 of Miyano, cited in the Office Action with respect to Claim 1, teach a step of extracting a differential region having an area equal to or wider than a predetermined threshold. This extracted differential region is

defined as the correction pattern region 17 (shown in Fig. 7). The predetermined threshold has nothing to do with measuring a first length of a first rib extending from the centerline to one edge of the feature. The predetermined threshold also has nothing to do with measuring a second length of a second rib extending from the centerline to the one edge of the feature.

Fig. 7 of Miyano shows a standard feature and a contour of a reticle pattern that are superimposed. Col. 5, lines 59-60. Therefore, this figure shows nothing regarding ribs extending from the centerline of the feature, wherein the centerline is based on a representation of the mask.

Col. 6, lines 12-24 of Kane (referring to Fig. 23) teach that a roughness of an edge 700 of a line 710 can be determined by comparing multiple average intensities in the y-direction. An average intensity is derived by averaging intensity values of a segment 720 extending in the x-direction. If the edge 700 varies, i.e. has bulges, the average intensity varies. The average intensities may be considered to form a waveform signal $y_i(t)$ extending in the y-direction. Therefore, this passage teaches nothing regarding comparing the first and second lengths (of the first and second recited ribs, respectively) to determine the edge roughness.

Because Miyano and Kane, either individually or in combination, fail to disclose or suggest Applicants' recited centerline and its use, Applicants request reconsideration and withdrawal of the rejection of Claim 1.

Claims 2-5 depend from Claim 1 and therefore are patentable for at least the reasons presented for Claim 1. Based on those reasons, Applicants request reconsideration and withdrawal of the rejection of Claims 2-5.

Claim 6 is cancelled, thereby rendering the rejection of that claim moot. Claim 8, which previously depended from Claim

6, has been amended to be an independent claim. Claim 8, as quoted below, now explicitly recites the limitations of Claim 6.

Specifically, Claim 8 recites in part:

determining an edge roughness of a feature on the mask, wherein if the edge roughness is outside a predetermined value, then using a lithography tool to repair the mask, wherein determining the edge roughness includes determining a centerline of the feature based on a defect-free representation of the feature.

Applicants respectfully submit that Miyano and Kane, either individually or in combination, fails to disclose or suggest that determining the edge roughness includes determining a centerline of the feature based on a defect-free representation of the feature. Applicants direct the Examiner's attention to Applicants' remarks regarding Claim 1 that refer to the recited centerline and its use. Applicants further direct the Examiner's attention to the Applicants' traversal of the various characterizations of Miyano and Kane. Therefore, Applicants submit that Claim 8 is patentable for substantially the same reasons as presented for Claim 1. Based on those reasons, Applicants request reconsideration and withdrawal of the rejection of Claim 8.

Claims 7 and 9, as amended, depend from Claim 8 and therefore are patentable for at least the reasons presented for Claim 8. Based on those reasons, Applicants request reconsideration and withdrawal of the rejection of Claims 7 and 9.

Claim 10 is cancelled, thereby rendering the rejection of that claim moot. Claim 12, which previously depended from Claim 10, has been amended to be an independent claim. Claim 12, as quoted below, now explicitly recites the limitations of Claim 10.

Specifically, Claim 12 recites in part:

determining an edge roughness of a feature on the wafer, wherein if the edge roughness is outside a predetermined value, then using a lithography tool to repair the wafer, wherein determining the edge roughness includes determining a centerline of the feature based on a defect-free representation of the feature.

Applicants respectfully submit that Miyano and Kane, either individually or in combination, fails to disclose or suggest these limitations. Applicants direct the Examiner's attention to Applicants' remarks regarding Claim 1 that refer to the recited centerline and its use. Applicants further direct the Examiner's attention to the Applicants' traversal of the various characterizations of Miyano and Kane. Therefore, Applicants submit that Claim 12 is patentable for substantially the same reasons as presented for Claim 1. Based on those reasons, Applicants request reconsideration and withdrawal of the rejection of Claim 12.

Claims 11 and 13, as amended, depend from Claim 12 and therefore are patentable for at least the reasons presented for Claim 12. Based on those reasons, Applicants request reconsideration and withdrawal of the rejection of Claims 11 and 13.

Claim 16 is cancelled, thereby rendering the rejection of that claim moot. Claim 18, which previously depended from Claim 16, has been amended to be an independent claim. Claim 18, as quoted below, now explicitly recites the limitations of Claim 16.

Specifically, Claim 18 recites in part:

determining any corner rounding of a contact on the wafer, wherein if the corner rounding is outside a predetermined value, then using a lithography tool to repair the wafer, wherein determining the corner rounding includes determining a centerline of the feature based on a defect-free representation of the feature.

Applicants respectfully submit that Miyano and Kane, either individually or in combination, fails to disclose or suggest that determining the corner rounding includes determining a centerline of the feature based on a defect-free representation of the feature. As discussed with respect to Claim 1, neither Miyano nor Kane teaches anything regarding a centerline based on a defect-free representation of the feature. It logically follows that neither reference can use such a centerline to determine corner rounding. Based on these reasons, Applicants request reconsideration and withdrawal of the rejection of Claim 18.

Claim 17, as amended, depends from Claim 18 and therefore is patentable for at least the reasons presented for Claim 18. Based on those reasons, Applicants request reconsideration and withdrawal of the rejection of Claim 17.

Claim 19, as amended, now recites in part:

wherein the automatic defect severity score is based on a measurement associated with a centerline of a defect-free representation of the repaired feature.

Applicants respectfully submit that Miyano and Kane, either individually or in combination, fails to disclose or suggest the recited automatic defect severity score. Applicants direct the Examiner's attention to Applicants' remarks regarding Claim 1 that refer to the recited centerline and its use. Applicants further direct the Examiner's attention to the Applicants' traversal of various characterizations of Miyano and Kane. Therefore, Applicants submit that Claim 19 is patentable for substantially the same reasons as presented for Claim 1. Based on those reasons, Applicants request reconsideration and withdrawal of the rejection of Claim 19.

Claims 20-23 depend from Claim 19 and therefore are patentable for at least the reasons presented for Claim 19. Based on those reasons, Applicants request reconsideration and withdrawal of the rejection of Claims 20-23.

Claim 24 recites in part:

means for determining a centerline for the simulated wafer image based on a defect-free representation of the feature.

Applicants respectfully submit that Miyano and Kane, either individually or in combination, fails to disclose or suggest at least this limitation. Applicants direct the Examiner's attention to Applicants' remarks regarding Claim 1 that refer to the recited centerline and its use. Applicants further direct the Examiner's attention to the Applicants' traversal of various characterizations of Miyano and Kane. Therefore, Applicants submit that Claim 24 is patentable for substantially the same reasons as presented for Claim 1. Based on those reasons, Applicants request reconsideration and withdrawal of the rejection of Claim 24.

Claims 25-30 depend from Claim 24 and therefore are patentable for at least the reasons presented for Claim 24. Based on those reasons, Applicants request reconsideration and withdrawal of the rejection of Claims 25-30.

Claim 31 recites in part:

means for determining a centerline for the simulated wafer image of the feature based on a defect-free representation of the feature.

Applicants respectfully submit that Miyano and Kane, either individually or in combination, fails to disclose or suggest at least this limitation. Applicants direct the Examiner's attention to Applicants' remarks regarding Claim 1 that refer to the recited centerline and its use. Applicants further direct the Examiner's attention to the Applicants' traversal of various

characterizations of Miyano and Kane. Therefore, Applicants submit that Claim 31 is patentable for substantially the same reasons as presented for Claim 1. Based on those reasons, Applicants request reconsideration and withdrawal of the rejection of Claim 31.

Claims 32-38 depend from Claim 31 and therefore are patentable for at least the reasons presented for Claim 31. Based on those reasons, Applicants request reconsideration and withdrawal of the rejection of Claims 32-38.

Claim 40 recites in part:

at least one feature being modified based on analyzing a centerline of a simulated wafer image of the feature, the centerline determined by a defect-free representation of the feature.

Applicants respectfully submit that Miyano and Kane, either individually or in combination, fails to disclose or suggest at least this limitation. Applicants direct the Examiner's attention to Applicants' remarks regarding Claim 1 that refer to the recited centerline and its use. Applicants further direct the Examiner's attention to the Applicants' traversal of various characterizations of Miyano and Kane. Therefore, Applicants submit that Claim 40 is patentable for substantially the same reasons as presented for Claim 1. Based on those reasons, Applicants request reconsideration and withdrawal of the rejection of Claim 40.

Claim 41 depends from Claim 40 and therefore is patentable for at least the reasons presented for Claim 40. Based on those reasons, Applicants request reconsideration and withdrawal of the rejection of Claim 41.

Claim 42 recites in part:

means for determining a centerline of the feature based on a representation of the mask;

means for measuring a first length of a first rib extending from the centerline to one edge of the feature;

means for measuring a second length of a second rib extending from the centerline to the one edge of the feature; and

means for comparing the first and second lengths to determine the edge roughness.

Applicants respectfully submit that Miyano and Kane, either individually or in combination, fails to disclose or suggest this limitation. Applicants direct the Examiner's attention to Applicants' remarks regarding Claim 1 that refer to the recited centerline and its use. Applicants further direct the Examiner's attention to the Applicants' traversal of various characterizations of Miyano and Kane. Therefore, Applicants submit that Claim 42 is patentable for substantially the same reasons as presented for Claim 1. Based on those reasons, Applicants request reconsideration and withdrawal of the rejection of Claim 42.

CONCLUSION

Claims 1-5, 7-9, 11-15, and 17-44 are pending in the present application. Allowance of these claims is respectfully requested.

If there are any questions, please telephone the undersigned at 408-451-5907 to expedite prosecution of this case.

Respectfully submitted,



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I hereby certify that this correspondence is being deposited with the United States Postal Service as FIRST CLASS MAIL in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on June 22, 2004.

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Date

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